Name:

at1124exam: Radicals and Squares (v806)

Question 1

Simplify the radical expressions.

$$\sqrt{18} \qquad\qquad \sqrt{99} \qquad\qquad \sqrt{8}$$

$$\sqrt{3 \cdot 3 \cdot 2} \qquad\qquad \sqrt{3 \cdot 3 \cdot 11} \qquad\qquad \sqrt{2 \cdot 2 \cdot 2}$$
$$3\sqrt{2} \qquad\qquad 3\sqrt{11} \qquad\qquad 2\sqrt{2}$$

Question 2

Find all solutions to the equation below:

$$2\left((x-10)^2 + 5\right) \;=\; 42$$

First, divide both sides by 2.
$$(x-10)^2 + 5 = 21$$

Then, subtract 5 from both sides.
$$(x-10)^2 = 16$$

Undo the squaring. Remember the plus-minus symbol.
$$x - 10 = \pm 4$$

Add 10 to both sides.
$$x = 10 \pm 4$$

So the two solutions are $x = 14$ and $x = 6$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 6x = 27$$

$$x^2 - 6x + 9 = 27 + 9$$
$$x^2 - 6x + 9 = 36$$
$$(x-3)^2 = 36$$
$$x - 3 = \pm 6$$
$$x = 3 \pm 6$$
$$x = 9 \qquad \text{or} \qquad x = -3$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 5x^2 - 30x + 52$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 5 .
$$y = 5(x^2 - 6x) + 52$$

We want a perfect square. Halve -6 and square the result to get 9 . Add and subtract that value inside the parentheses.
$$y = 5(x^2 - 6x + 9 - 9) + 52$$

Factor the perfect-square trinomial.
$$y = 5((x-3)^2 - 9) + 52$$

Distribute the 5.
$$y = 5(x-3)^2 - 45 + 52$$

Combine the constants to get **vertex form**:

$$y = 5(x-3)^2 + 7$$

The vertex is at point $(3, 7)$.